

User's Manual

CITIZEN
LINE THERMAL PRINTER
MODEL CBM - 230/231

Japan CBM Corporation

Declaration of Conformity

Manufacturer's Name : Japan CBM Corporation
 Manufacturer's Address : CBM Bldg.,5-68-10, Nakano, Nakano-ku, Tokyo
 164-0001, Japan

Declare the Product

Product Name Thermal Printer
 Model Number(s) CBM-230 Series
 (CBM230R,CBM230P,CBM231R,CBM231P)
 (S.No.95Y0001 ~)

Conform to the following Standards

LVD	: EN60950:	1992+A1+A2 : 1993
EMC	: EN55022:	1994 Class A
	: EN61000-3-2:	1995
	: EN50082-1:	1992
	: IEC801-2:	1991 4KV CD, 8KV AD
	: IEC801-3:	1984 3V/m, 27MHz-500Mhz
	: IEC801-4:	1988 0.5KV Signal Line, 1KV AC mains

Supplementary Information

“The product complies with the requirements of the Low Voltage Directive 73/23/EEC, 93/68/EEC and the EMC Directive 89/336EEC, 92/31/EEC, 93/68EEC”

Place Tokyo, Japan

Signature

Date March, 1998



Full Name: Mikio Moriya
 Position: General Manager
 R & D Department

Europe Contact :

Norco Declaration AB
 Box 7146 S-250 07 Helsingborg Sweden

Warning :

This is a Class A products. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

This declaration is applied only for 230V model.

IMPORTANT SAFETY INSTRUCTIONS

- Read all of these instructions and save them for future reference.
- Follow all warnings and instructions marked on the product.
- Unplug this product from the wall outlet before cleaning. Do not use liquid or aerosol cleaners. Use a damp cloth for cleaning.
- Do not use this product near water.
- Do not place this product on an unstable cart, stand or table. The product may fall, causing serious damage to the product.
- Slots and openings on the back or bottom of the case are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, do not block or cover these openings. The openings should never be blocked by placing the product on a bed, sofa, rug or other similar surface. This product should never be placed near or over a radiator or heater. This product should not be placed in an built-in installation unless proper ventilation is provided.
- This product should be operated from the type of power source indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not place this product where the cord will be walked on.
- If an extension cord is used with this product, make sure that the total of the ampere ratings of the products plugged into the extension cord does not exceed the extension cord ampere rating. Also, make sure that the total of all products plugged into the wall outlet does not exceed 15 amperes.
- Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock. Never spill liquid of any kind on the product.
- Except as explained elsewhere in this manual, do not attempt to service this product by yourself. Opening and removing the covers that are marked "Do Not Remove" may expose you to dangerous voltage points or other risks. Refer all servicing on those compartments to service personnel.
- Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
 - A. When the power cord or plug is damaged or frayed.
 - B. If liquid has been spilled into the product.
 - C. If the product has been exposed to rain or water.
 - D. If the product does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.
 - E. If the product has been dropped or the cabinet has been damaged.
 - F. If the product exhibits a distinct change in performance, indicating a need for service.

IMPORTANT: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

CAUTION: Use shielded cable for this equipment.

Sicherheitshinweis

Die Steckdose zum Anschluß dieses Druckers muß nahe dem Gerät angebracht und leicht zugänglich sein.

For Uses in Canada

This digital apparatus does not exceed the class A limits for radio noise emissions from digital, apparatus, as set out in the radio interference regulations of the Canadian department of communications.

Pour L'utilisateurs Canadiens

Cet appareil numérique ne dépasse pas les limites de catégorie A pour les émissions de bruit radio émanant d'appareils numériques, tel que prévu dans les règlements sur l'interférence radio du département Canadien des communications.

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1. GENERAL DESCRIPTION

This is a small line thermal printer developed to be used for various data communication terminals such as POS terminals and kitchen printers. POS terminals, kitchen printers, and so on. With its abundant features, it can be widely used for various types of applications. Read this manual thoroughly prior to using the printer to understand its contents.

1.1 Features

1. Compact, light-weight, and small installation area required
2. High speed and low noise due to line thermal printing
3. High reliability due to long-life printing head and simple mechanism
4. Input buffer incorporated
5. Capable of printing a bar codes (exclusive command)
6. Drawer kickout interface incorporated
7. Equipped with an auto cutter (CBM-231)
8. User-Defined character registration function (95 characters)
9. Easy handling due to incorporated power supply

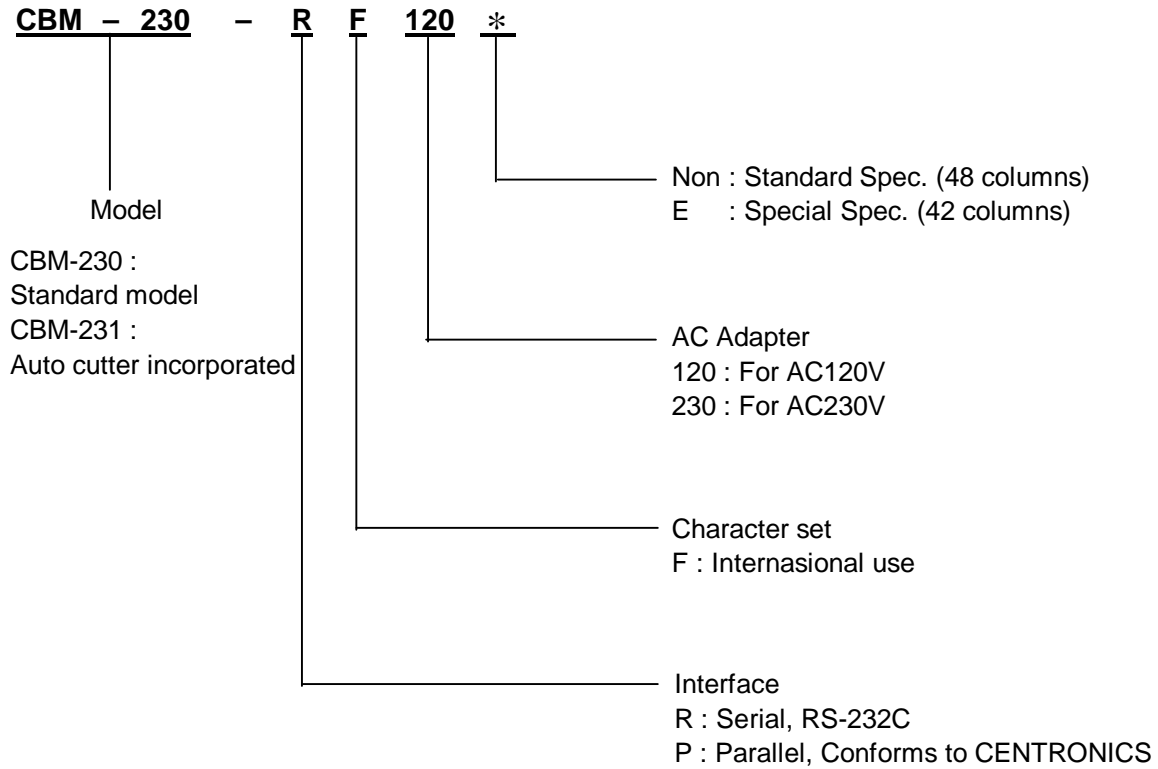
1.2 Precautions for Installation

1. Upon unpacking the printer, make sure that the following parts are contained in the package.
 - Printer main body 1 unit
 - Sample paper roll 1 roll
 - Instruction manual 1 copy
2. Install the printer on a flat and stable desk or table.
3. Do not install the printer near a heater or in the direct sunshine.
4. Do not use the printer in a high -temperature, high-humidity, or contaminated environment.
5. Prepare a separate AC power supply from other equipment which causes noises.
6. Connect only a specified solenoid to the drawer kick connector.
7. When transporting or not using the printer for a long period of time, leave the printing head kept up.

2. BASIC SPECIFICATIONS

2.1 Model Classification

The model is classified by the following designation method.



2.2 Specifications List

Item	Description
Printing method	Line thermal dot printing system
Printing width	72 mm/576 dots *(63 mm/504 dots)
Dot density	8 dots/mm (horizontal, vertical)
Printing speed	62.5 mm/sec. (at max. speed) (500 dot Line/sec.)
Number of columns	48 columns *(42 columns): (12 × 24, Font A) 64 columns *(56 columns): (9 × 17, Font B)
Character dimensions	1.25 mm × 3.00 mm (12 × 24, Font A) 0.88 mm × 2.13 mm (9 × 17, Font B)
Character types	Alphanumeric, International characters
Bar code types	UPC-A/E, JAN(EAN) 13 columns/8 columns, ITF CODE 39, CODE 128, CODABAR
Line pitch	4.23mm (1/6 inch.), Can be selected by a command (min. 1/203 inch)
Printing paper	Thermal paper roll, 80 mm × φ83 mm (Refer to Specifications for Printing Paper)
Interface	Serial (RS-232C), Parallel (Conforms to CENTRONICS)
Input buffer	72 bytes / 4 KB (Can be selected with the DIP switch)
Supply voltage	120 V AC ± 10 %, 60 Hz 230 V AC ± 10 %, 50 or 60 Hz
Power consumption	100W
Weight	1.70 kg (CBM-230), 1.85 kg (CBM-231)
Outer Dimensions	145 (W) × 216 (D) × 150 (H)
Operating temperature	5 to 40°C
Storage temperature	-20 to 60°C
Reliability	Print head's life : Pulse resistance ... 50 million pulses (printing rate 12.5%) Wear resistance ... 30 km (at normal temperature and humidity, with specified recommended paper) Auto cutter's life : 300,000 cuts

* 42 columns spec.(Special ROM only)

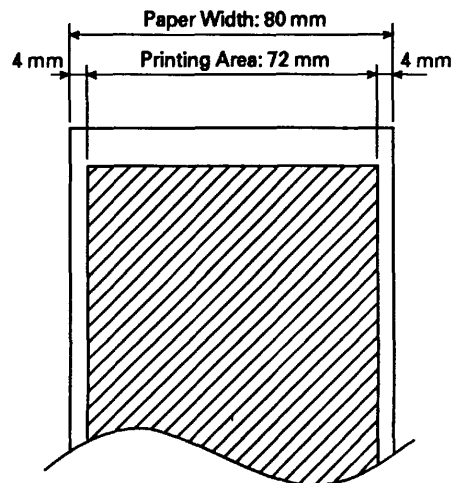
2.3 Specifications for Printing Paper

2.3.1 Specified Paper

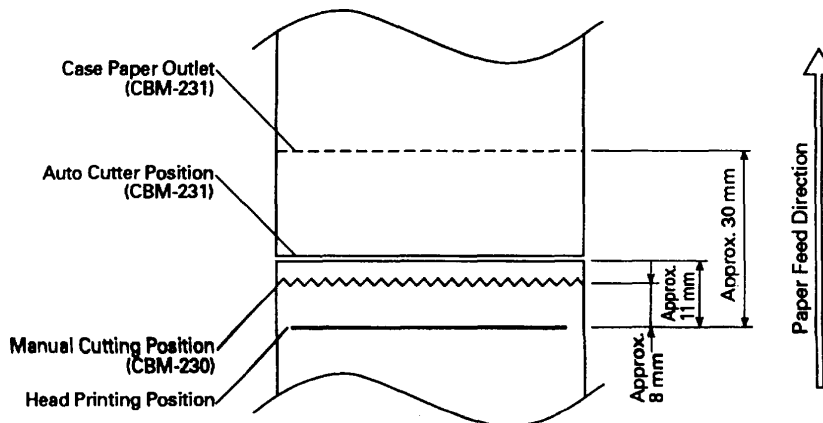
Type	: Thermal paper
Paper width	: 80 + 0 or -1 mm
Paper thickness	: $65 \pm 5\mu\text{m}$
Roll diameter	: $\phi 83$ mm or less
Print surface	: Outside of the roll (surface)
Recommended paper	: TF50KS-E2C made by Nihon Seishi or other equivalent
Core	: $\phi 12$ (inner diameter), $\phi 18$ (outer diameter)

[Caution] Do not paste the paper to the core.

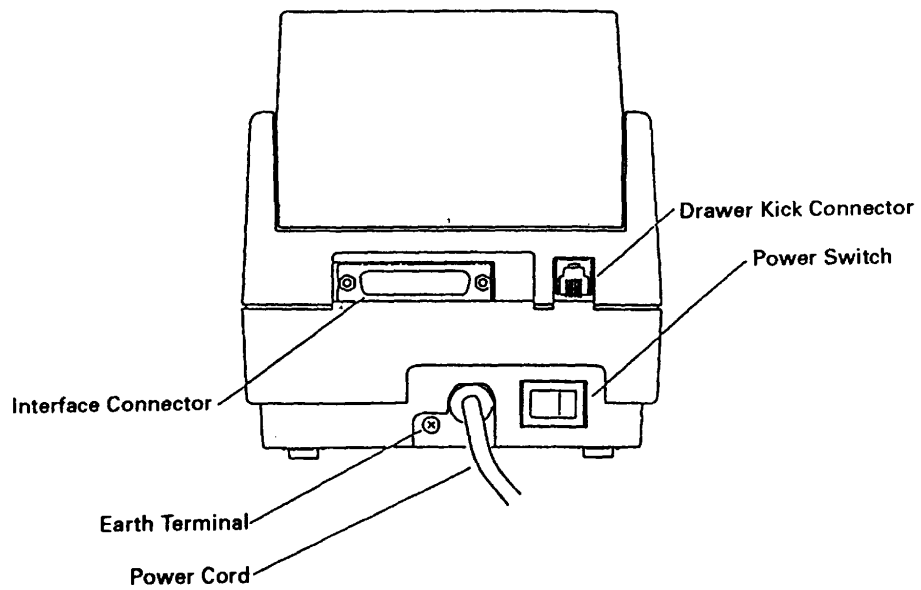
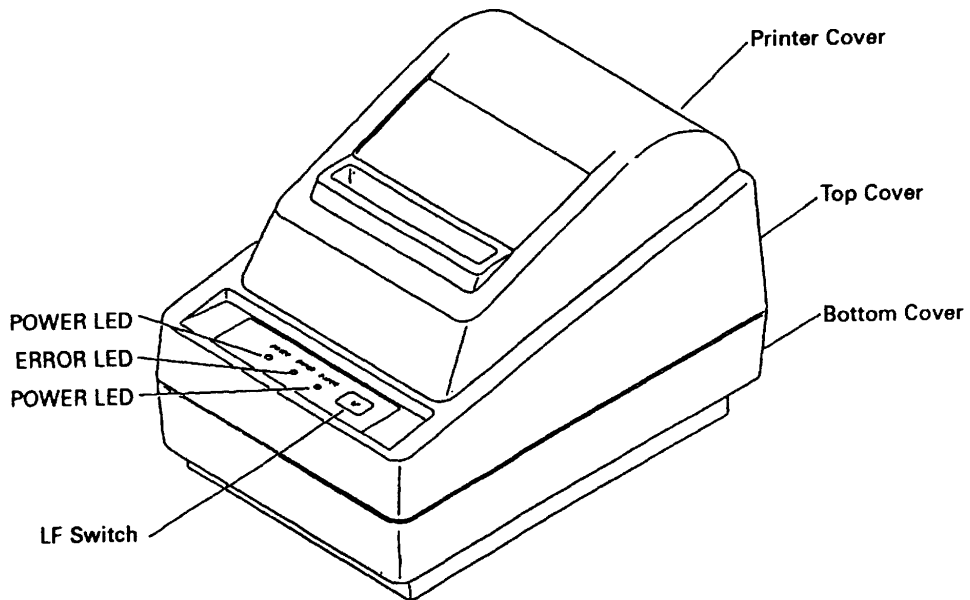
2.3.2 Printing Position



2.3.3 Head and Cutter Positional Relations



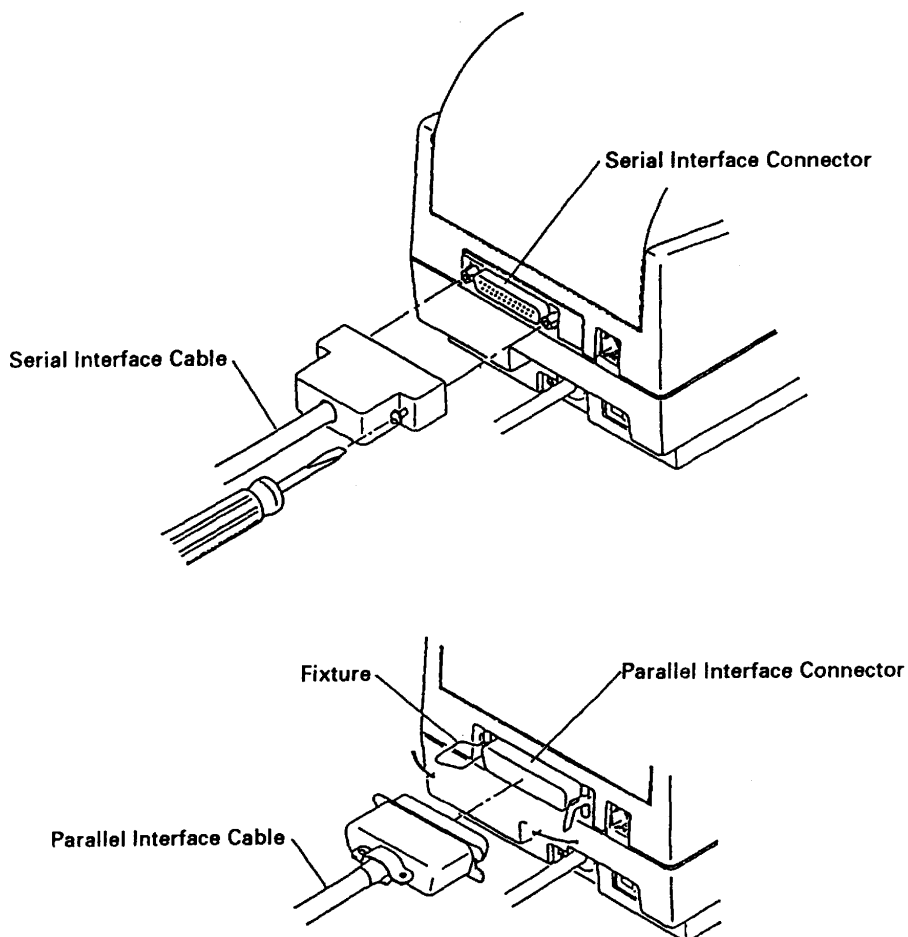
3. APPEARANCE AND COMPONENT PARTS



4. OPERATION

4.1 Connecting the Interface Cable

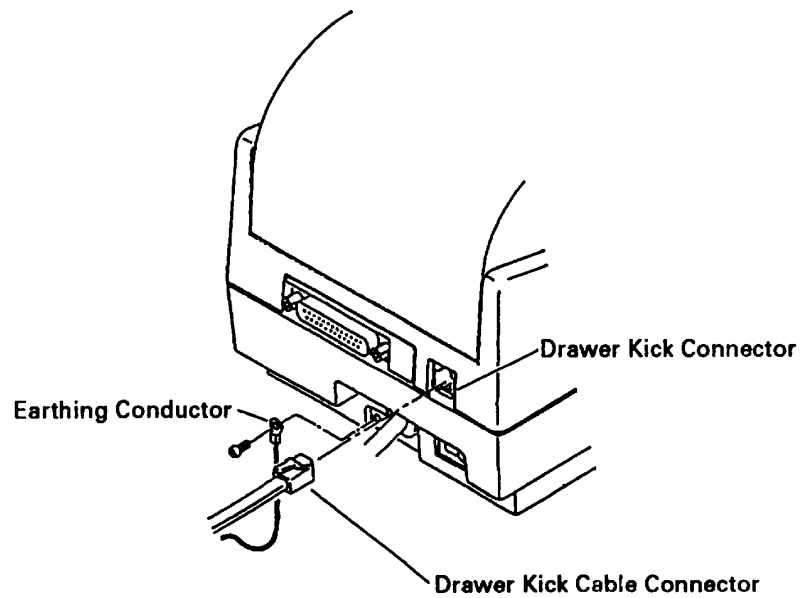
1. Turn off the power.
2. Confirm the vertical direction of a cable terminal and connect it to the interface connector.
3. Fix the cable terminal.
 - Serial interface : Tighten screws to fix.
 - Parallel interface : Turn a fixture in an arrow direction to fix.
4. Connect the cable to the computer.



4.2 Connecting the Drawer Kick Connector

1. Turn off the power.
2. Confirm the vertical direction of a drawer kick cable connector and insert it into the drawer kick connector on the back of the printer.
3. Using a screw, fix a drawer's earthing conductor to the earth terminal of the printer.

[Caution] Connect only a specified drawer(solenoid) to the drawer kick connector.

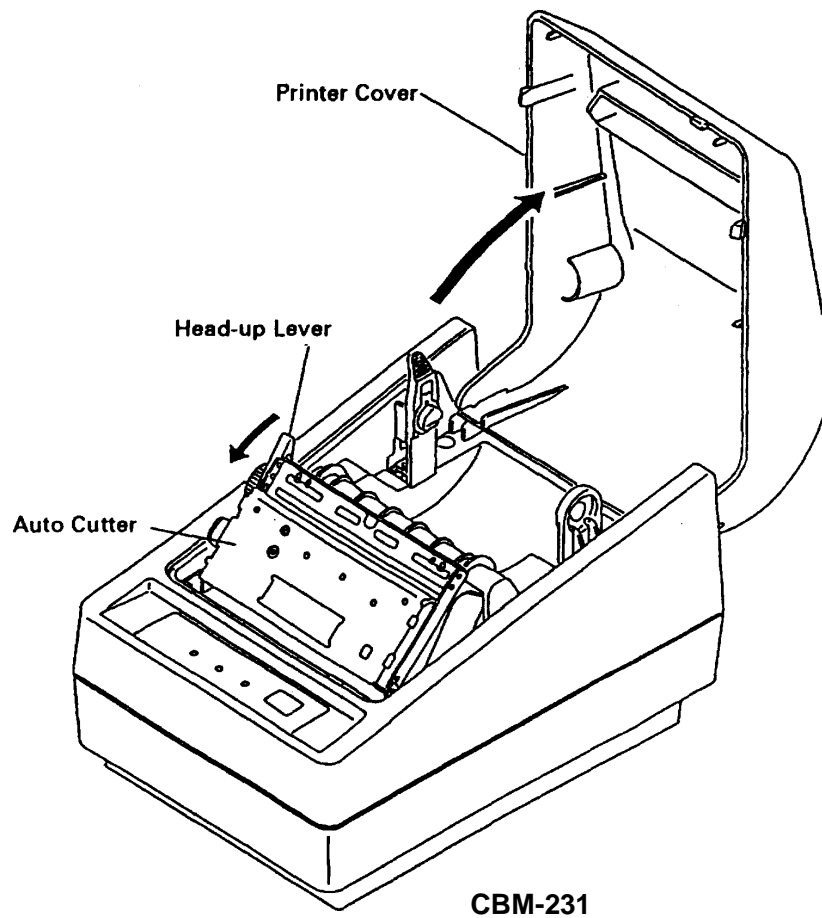


4.3 Inserting the Paper Roll

[Caution] Be sure to use a specified paper roll.

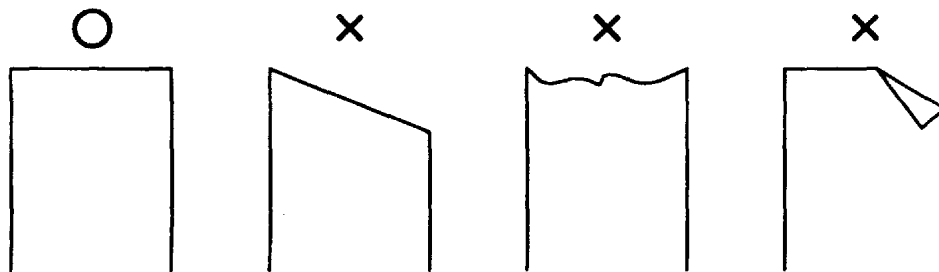
1. Open the printer cover.
2. Shift the head-up lever in an arrow direction to move up the printing head.

[Caution] When setting the paper roll, you do not have to open the auto cutter. (CBM-231)



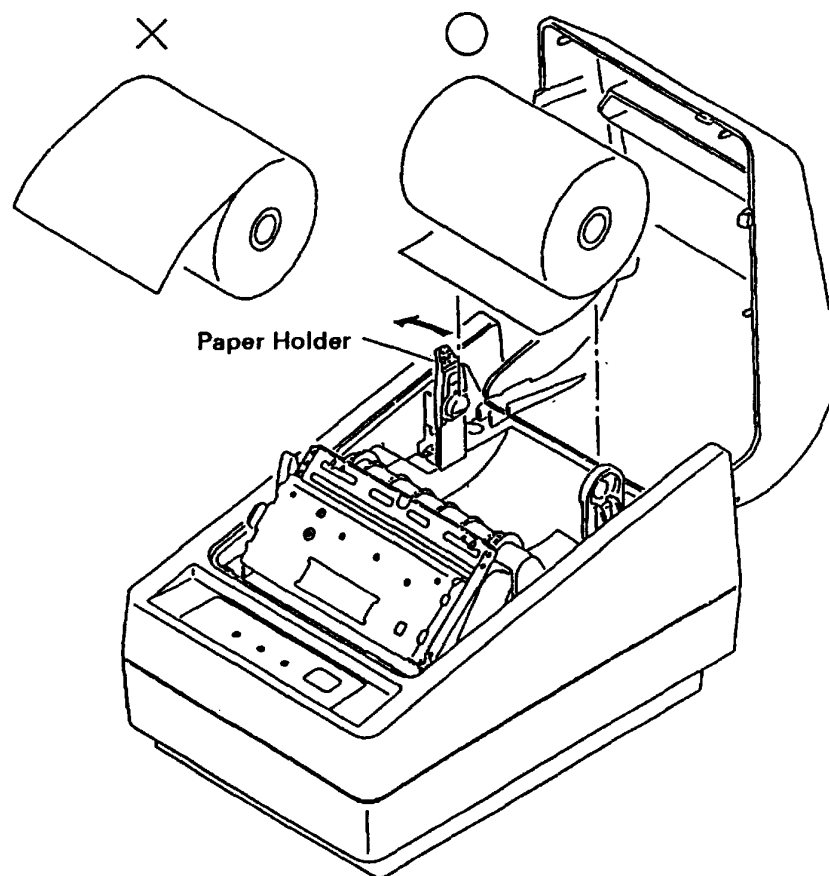
- Using the scissors, cut the end of the paper at a right angle.

[Caution] Do not insert the paper with its end fluffed or bent.



- Confirm the winding direction of the paper roll. Opening the paper holder in the direction of the arrow, set the paper and hold the core center properly.

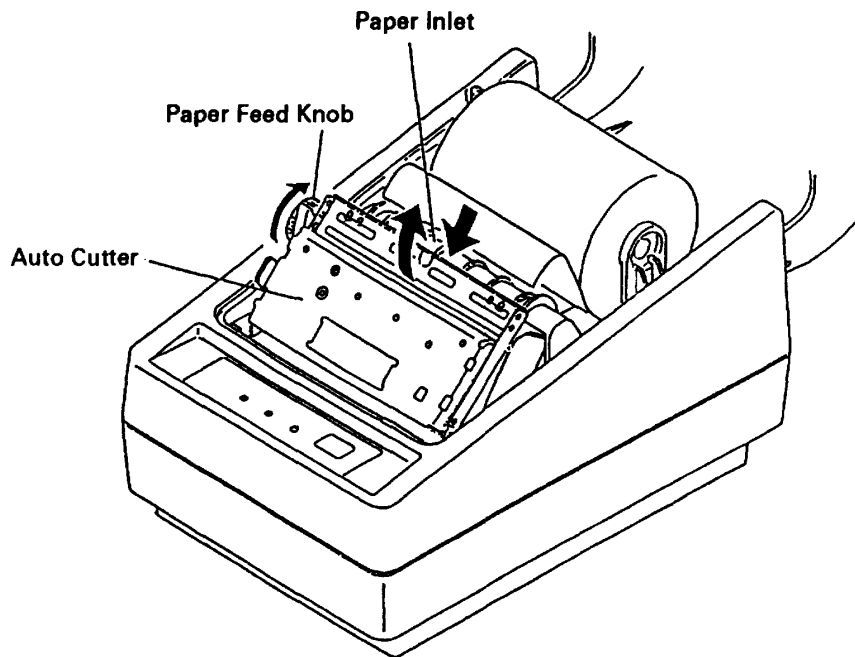
[Caution] Make sure that the paper roll rotates smoothly without tilting the paper.



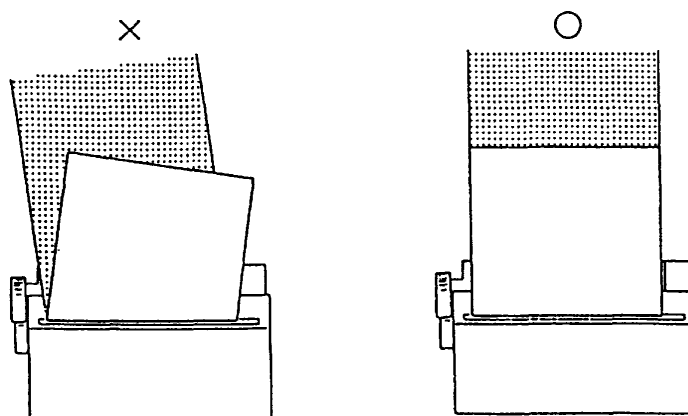
5. Insert the end of the paper into the paper inlet, turn the paper feed knob in the direction of the arrow to feed out the paper about 5 cm from the paper outlet of the auto cutter or nose of the manual cutter.

(The figure below shows the CBM-231).

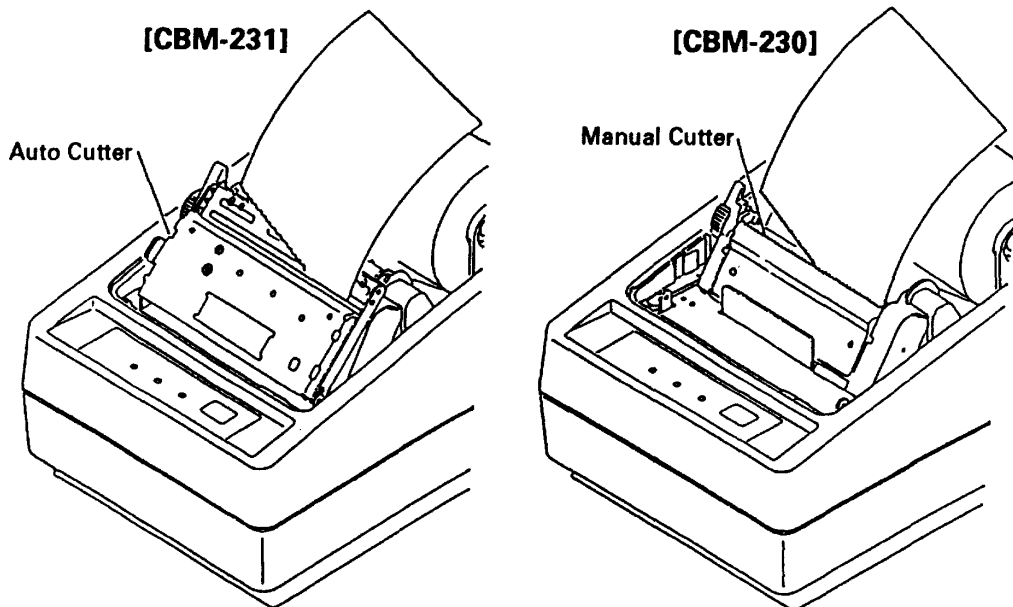
[Caution] Do not turn the paper feed knob when the printing head is in its down position.



6. When the paper is tilting, correct it and move the printing head down.



7. Cut off the surplus paper at the edge of the paper outlet of the auto cutter or blade of the manual cutter.



8. Close the printer cover. You are finished with setting of the paper roll.

[Caution] Do not open the printer cover during printing.

9. When removing the remaining paper upon its replacement with new one, pull it out straight with the printing head kept up.

10. When using the auto loading function, follow the procedure below.

- (1) Change the setting of the DIP switch to the auto loading mode. (Turn on DS1 -3)
- (2) Move the printing head up.
- (3) Insert the end of the paper straight into the paper inlet of the printer and move down the printing head. The paper is automatically pulled in by a constant amount.
- (4) Close the printer cover to finish setting of the paper roll.

[Caution] When the paper is tilting, move up the printing head and correct it manually.

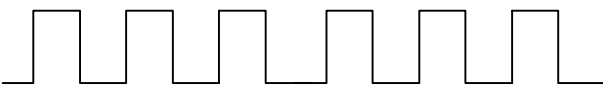

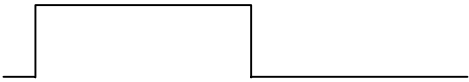
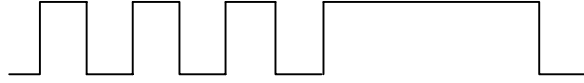
4.4 Operation Panel

1. POWER LED(green)

Illuminated when the power is supplied.

2. ERROR LED(red)

Indicates different errors, depending on the illuminated or blinking condition.

Error	Display pattern	Resetting Method
Printer cover open	Illuminated	Close the cover
Head Up	Illuminated	Move down the head
Memory check		Disabled
Head overheat		Automatically reset by temperature drop
Macro execution wait		Press the LF switch
Cutter motor lock		Eliminate paper jam and press LF switch

3. PAPER LED(red)

Near end enabled : Illuminated when the paper is near its end (Stops after printing the set length)

Near end disabled : Illuminated when the paper is at its end (Stops printing)

[Caution] Use the DIP switch to enable or disable the near end detecting function.

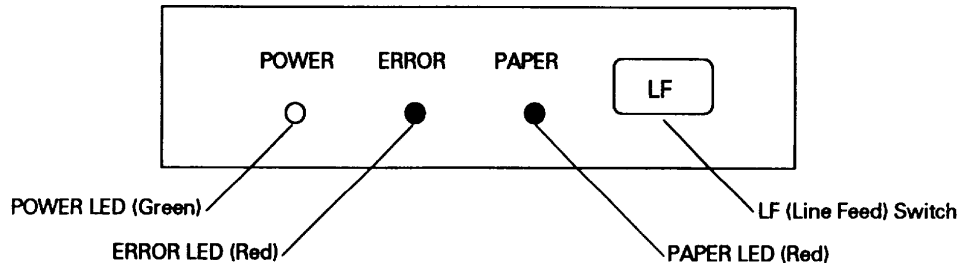
4. LF switch

Pressing this switch for a short time feeds the paper by one line. Holding it down feeds the paper continuously. In case of macro execution wait, pressing the LF switch executes it.

[Caution] Depending on a selection of the DIP switch, the paper can be fed when the cover is opened.

5. LF switch and power switch

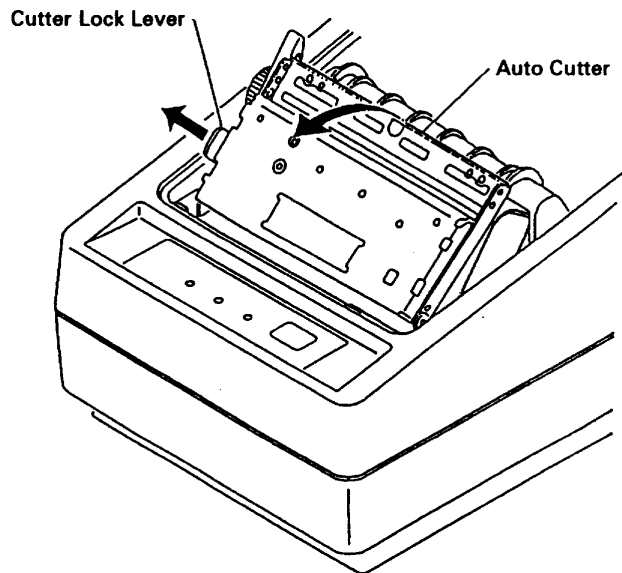
Self-printing is performed by turning on the power switch with the LF switch held down.



4.5 Opening the Auto Cutter(CBM-231)

When the paper is jamming or when you open the auto cutter in order to clean the head, raise the auto cutter, pulling the cutter lock lever in the direction of the arrow.

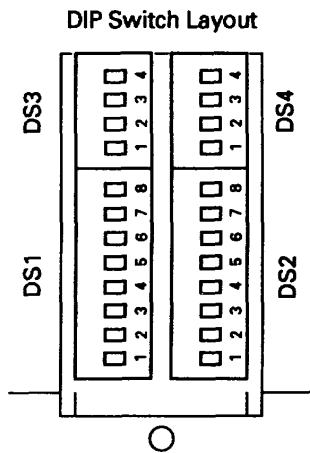
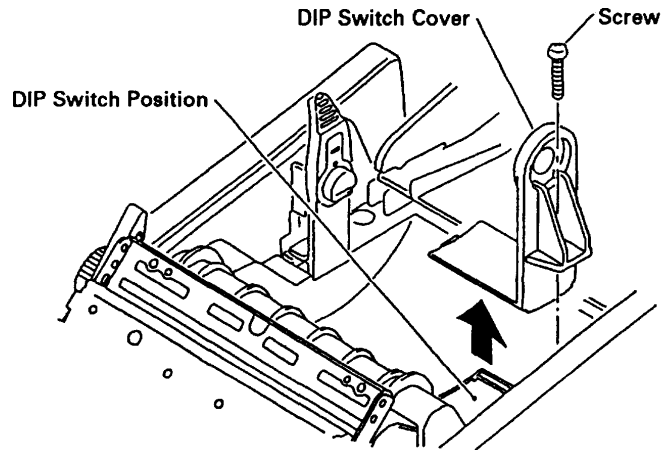
[Caution] Immediately after printing, the printing head and motor have a high temperature.
Never touch the printing head and motor when you open the auto cutter.



5. SETTING OF DIP SWITCHES

The DIP switches are located in the position shown in the figure below. Unscrew and remove the DIP switch cover.

[Caution] Turn off the power to set the DIP switch.



		ON	OFF	Setting upon Shipment
DS1-1	Paper cutter	Provided	Unprovided	*
-2	Cover open	Disabled	Enabled	OFF
-3	Auto loading	Enabled	Disabled	OFF
-4	Input buffer	72 bytes	4K bytes	OFF
-5	Paper near end	Disabled	Enabled	OFF
-6	Paper near end remainder 1	Refer to the table below		OFF
-7	Paper near end remainder 2			OFF
-8	CR switching	LF activated	Ignored	OFF

		ON	OFF	Setting upon Shipment
DS2-1	Print density	Refer to the table below		ON
-2	Print density			OFF
-3	International character		International	OFF
-4	Unused			OFF
-5	International character	Refer to the table below		OFF
-6	International character			OFF
-7	International character			OFF
-8	International character			OFF

		ON	OFF	Setting upon Shipment
DS3-1	Bit length	7 bits		OFF
-2	Parity	Provided	Unprovided	OFF
-3	Odd / even	Even	Odd	OFF
-4	DTR / XON-XOFF	XON-XOFF	DTR / DSR	OFF

		ON	OFF	Setting upon Shipment
DS4-1	Baud rate	Refer to the table below		OFF
-2	Baud rate			ON
-3	Baud rate			ON
-4	Unused			OFF

The switch segment marked * are set depending on types.

The DIP switches DS3 and DS4 are only for the serial interface.

Remaining printable Length	0 cm	50 cm	1 m	2 m
DS1-6	OFF	ON	OFF	ON
-7	OFF	OFF	ON	ON

Print density	Light	Standard	Dark	Darker
DS2-1	OFF	ON	OFF	ON
-2	OFF	OFF	ON	ON

International Character	U.S.A.	France	Germany	U.K.	Denmark I	Sweden	Italy	Spain	Japan	Norway	Denmark II
DS2-5	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	OFF	OFF
-6	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON
-7	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	ON	OFF
-8	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON

Baud Rate	150	300	600	1200	2400	4800	9600	19200
DS4-1	OFF	ON	OFF	ON	OFF	ON	OFF	ON
-2	OFF	OFF	ON	ON	OFF	OFF	ON	ON
-3	OFF	OFF	OFF	OFF	ON	ON	ON	ON

6. PARALLEL INTERFACE

6.1 Specifications

Data input method	: 8-bit parallel(DATA 1-8)		
Control signal	: $\overline{\text{ACK}}$, $\overline{\text{BUSY}}$, $\overline{\text{STB}}$, $\overline{\text{FAULT}}$, $\overline{\text{PE}}$, $\overline{\text{RESET}}$		
Applicable connectors	Printer side	:	57LE-40360(equivalent to amphenol)
	Cable side	:	57-30360(equivalent to amphenol)

6.2 Connector's Pin Configuration

No.	Signal Name	No.	Signal Name
1	$\overline{\text{STB}}$	19	TWISTED PAIR GND
2	DATA 1	20	TWISTED PAIR GND
3	DATA 2	21	TWISTED PAIR GND
4	DATA 3	22	TWISTED PAIR GND
5	DATA 4	23	TWISTED PAIR GND
6	DATA 5	24	TWISTED PAIR GND
7	DATA 6	25	TWISTED PAIR GND
8	DATA 7	26	TWISTED PAIR GND
9	DATA 8	27	TWISTED PAIR GND
10	$\overline{\text{ACK}}$	28	TWISTED PAIR GND
11	$\overline{\text{BUSY}}$	29	TWISTED PAIR GND
12	$\overline{\text{PE}}$	30	TWISTED PAIR GND
13	+5V DC	31	$\overline{\text{RESET}}$
14		32	$\overline{\text{FAULT}}$
15		33	GND
16	GND	34	DRAWER SWITCH OUTPUT
17	FRAME GND	35	+5V DC
18		36	

6.3 Input / Output Signals

6.3.1 Input / Output Signals

(1) Input signals to the printer

- DATA : This is an 8-bit parallel signal (Positive logic)
- $\overline{\text{STB}}$: This is a strobe signal to read in 8-bit data (Negative logic)
- $\overline{\text{RESET}}$: This signal resets the entire printer (Negative logic) 1 ms or more

(2) Output signals from the printer

- $\overline{\text{ACK}}$: This is an 8-bit data request signal. Pulse signal output at the end of the BUSY signal (Negative logic)
- BUSY : This signal indicates the BUSY state of the printer. Enter new data when it is at LOW. (Positive logic)
- $\overline{\text{FAULT}}$: This signal is set to low when the printer has an alarm. When this is done, all control circuits in the printer stop. (Negative logic)
- PE : This signal is output when the printing paper has run out or is running out. (Positive logic)
- Drawer switch output : This signal is set to HIGH when the switch is opened, and to LOW when shorted.

(3) Power signals

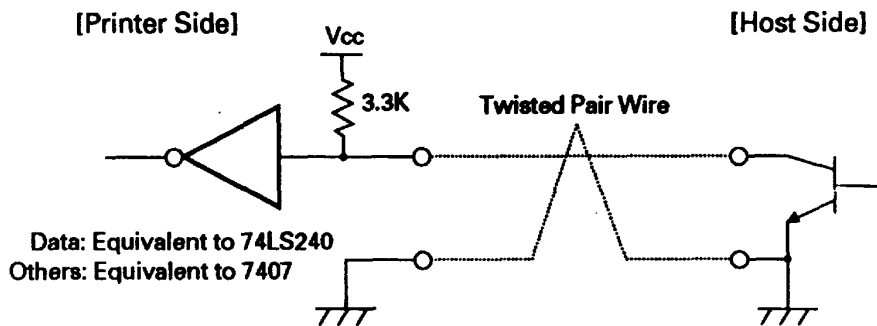
- +5VDC : This is a 5 V output pulled up at a 3.3 k Ω resistor.
- GND : This is a common ground on the circuits.

6.3.2 Electrical Characteristics

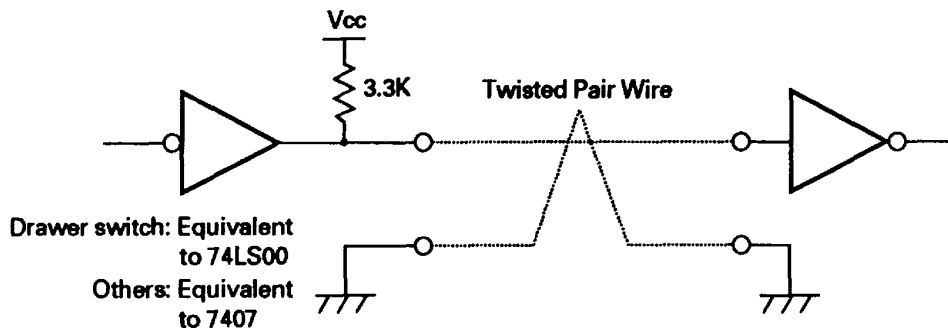
- (1) Input signal level
 All input signals are at the TTL level.
 "HIGH" level: 2.0 V at minimum
 "LOW" level : 0.8 V at maximum

- (2) Output signal level
 All output signals are at the TTL level.
 "HIGH" level: 2.4 V at minimum
 "LOW" level : 0.4 V at maximum

- (3) Input/output conditions
 All input signals are pulled up at 3.3 kΩ.

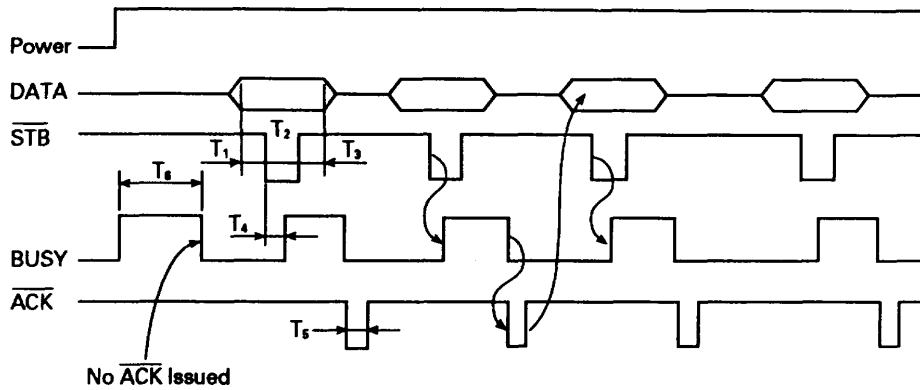


All output signals are pulled up at 3.3 kΩ.



6.3.3 Timing Chart

(1) Data input and printing timing



T ₁ , T ₂ , T ₃	0.5 μs	MIN
T ₄	270 ns	MAX
T ₅	2.3 μs	TYP
T ₆	500 ms	MIN (at power on)

6.3.4 Data Receiving Control

When the BUSY signal is at LOW, the data from the host side can be received, but when at HIGH, it cannot be received.

6.3.5 Buffering

A size of the input buffer can be selected by setting the DIP switch segment DS1-4. When a 4KB buffer is selected, the host side is immediately free because a large amount of data can be buffered.

7. SERIAL INTERFACE

7.1 Specifications

- (1) Synchronizing system : Asynchronous

- (2) Baud rate
150, 300, 600, 1,200, 2,400, 4,800, 9,600, 19,200 bps (Selected by the user)

- (3) Word length
 - Start bit : 1 bit
 - Data bit : 7 bits or 8 bits (Selected by the user)
 - Parity bit : Odd/even parity or no parity (Selected by the user)
 - Stop bit : 1 bit or more

- (4) Signal polarity
RS-232C
 - Mark = Logic "1" (-3 V to -12 V)
 - Space = Logic "0" (+3 V to +12 V)

- (5) Receive data (RD signal)
RS-232C
 - Mark = 1
 - Space = 0

- (6) Data receiving control (DTR signal)
RS-232C
 - Mark : Data transfer not possible
 - Space : Data transfer possible

- (7) Data transmission control (TD signal)
 - DC1 code(11H) X-ON : Data reception possible
 - DC3 code(13H) X-OFF : Data reception not possible

7.2 Connector's Pin Configuration

No.	Signal Name	Input/Output	Function
1	FG		Frame Grand
7	GND		Signal GND
3	RD	Input	Receiving data
20	DTR	Output	Printer BUSY signal
2	TD	Output	Transmission data
6	DSR	Input	Data set ready

- [Cautions]
1. RS-232C signals are based on the EIA RS-232C.
 2. When no data is being transferred, the receive data should be always maintained in the mark state.

Applicable connectors (D-Sub connectors)

Printer side : 17LE-13250 (Equivalent to DDK)

Cable side : 17JE-23250 (Equivalent to DDK)

7.3 Input / Output Signals

7.3.1 Input / Output Signals

(1) RD

This is a serial receive data signal. When there is a framing error, overrun error, or parity error, that data is printed as "?."

(2) DTR

Write the data or a command when this signal is ready. If you write while it is busy, the data will be ignored, resulting in an overrun error. The data can be written into the input buffer even during printing.

A BUSY signal is also issued at power-on, during test printing, in the on-line mode, or upon occurrence of reset.

(3) TD

When the remaining capacity of the input buffer on the printer side comes to 10 bytes(at 72 bytes) or 128 bytes(at 4K bytes) while receiving the data, DC3(13H), a data reception impossible signal, is output.

When the remaining capacity of the input buffer comes to over 20 bytes(at 72 bytes) or 256 bytes(at 4K bytes)DC1(11H), a data reception possible signal is output to the host side.

When transmitting the status information, if DTR/DSR control has been selected, the data will be transmitted after confirming that DSR is a space.

If DTR/DSR control has not been selected, the data will be transmitted, ignoring DSR.

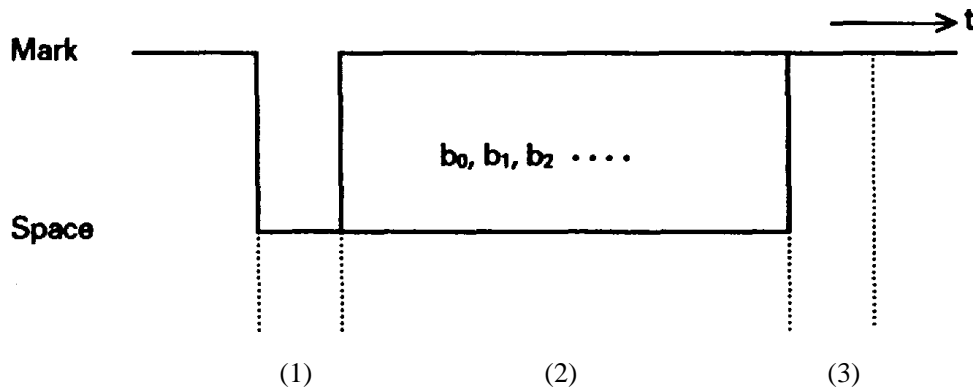
(4) FG

This is a Frame ground.

(5) GND

This is a common ground on the circuits.

7.3.2 Data Configuration



- (1) Start bit
- (2) Data bit(+ parity bit)
- (3) Stop bit(1 or more)

(1) Start bit

When half a bit has passed since a fall edge of a mark to a space, the state of the bit is read in again, and if it is a space, it will be recognized as a start bit. If it is a mark, it will not be recognized as the start bit. The start bit will be detected again without assuming it to be an error.

(2) Data bit + parity bit

The data bit and parity bit are sampled for one bit worth of time since the time of half the start bit and assume the then state to be the data for the relevant bits. The bits are arranged in order of bit 0, bit 1, ..., parity bit, starting from the one next to the start bit.

(3) Stop bit

The stop bit is a 1-bit or more mark level. If a space is detected in detecting the stop bit, a framing error will result.

7.3.3 Error Detection

A parity error, framing error, and overrun error are detected. When an error is detected, that data is stored in the buffer as "?."

(1) Framing error

When a space is detected at stop bit detection time, an error result. That data is stored in the buffer as "?."

(2) Parity error

When a parity check has been specified and an error is detected at parity check time, that data is stored in the buffer as "?."

(3) Overrun error

When an overrun error is detected, that data is stored in the buffer as "?."

7.3.4 Data Receiving Control

When DTR/DSR control has been selected, if the DTR signal is at SPACE, the data from the host side can be received, but when at MARK, it cannot be received. When DTR/DSR control has not been selected, the data from the host side can be received after transmitting XON, but it cannot be received after transmitting XOFF.

7.3.5 Buffering

There are DTR and TD signals as control signals for data transfer to the input buffer.

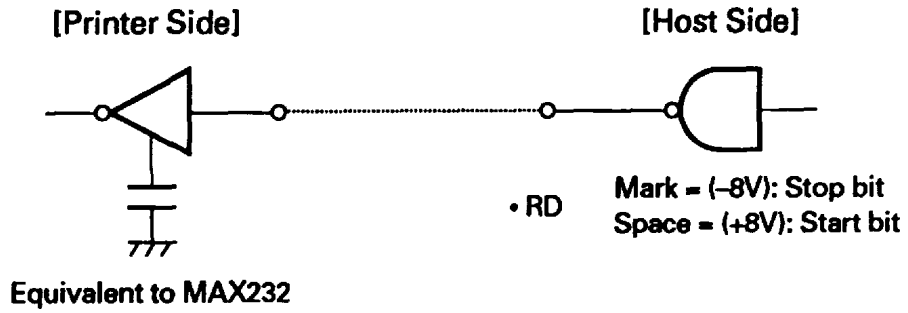
(1) DTR signal (Refer to 7.3 1)

(2) TD signal (Refer to 7.3 1)

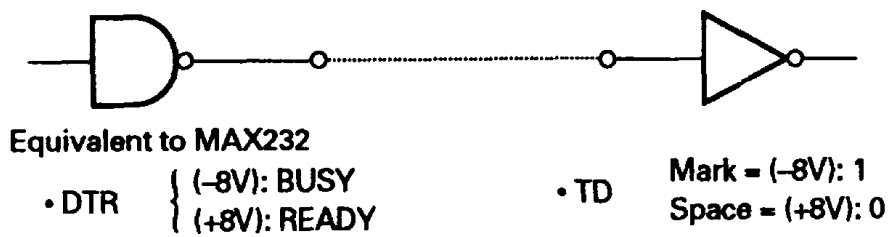
7.3.6 Electrical Characteristics

(1) RS-232C circuit

Input (RD, DSR)



Output (DTR, TD)



8. DRAWER KICK CONNECTOR

8.1 Specifications

(1) Drawer kick drive signal

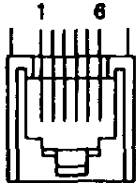
The pulses specified by ESC p are output. The state of the switch(+) can be known through the pin 34 of the interface connector when parallel interface is used, and through the ESC u command when the serial interface is used.

(2) Electrical characteristics

- 1) Drive voltage : DC 24 V
- 2) Drive current : 0.8 A at maximum(should be within 510 ms)
- 3) Switch signal : Signal level "L" = 0 to 0.5 V
"H" = 3 to 5 V

8.2 Connector's Pin Configuration

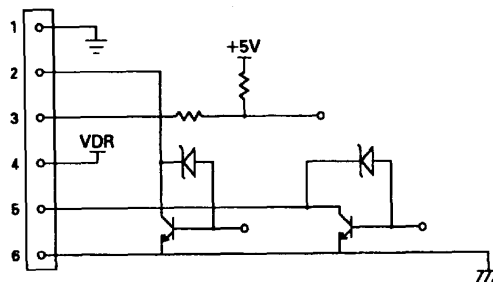
No.	Signal Name	Function
1	FG	Frame ground
2	DRAWER 1	Drawer 1 drive signal
3	DRSW	Drawer switch input
4	VDR	Drawer driving power
5	DRAWER 2	Drawer 2 drive signal
6	GND	Common ground on the circuits



Connector used : TM5RJ3-66(HIROSE)
 Applicable connector : Equivalent to TM3P-66P(HIROSE)

- [Cautions]
- 1) No output is allowed during printing.
 - 2) The drawers 1 and 2 cannot be driven at the same time.
 - 3) A solenoid for the drawer should be of 36Ω or more.
 (See to it that an output current will not exceed 0.8 A. Be careful not to use a drawer with a current over 0.8A to avoid damage to the printer.)

8.3 Drive Circuit



9. PRINT CONTROL FUNCTION

9.1 Control Codes List

	Character	Command/Description
1	HT	Horizontal tab command
2	CR	Print command
3	LF	Printing and paper feed
4	ESC SP	Setting the right space amount of the character
5	!	Specifying collective the print mode
6	%	Specifying/canceling the download character set
7	&	Defining the download characters
8	*	Specifying the bit image mode
9	–	Specifying/canceling the underline
10	2	Specifying the 1/6-inch line feed rate
11	3	Setting the line feed rate n/360 inch
12	@	Initializing the printer
13	D	Setting the horizontal tab position
14	E	Specifying/canceling highlighting
15	G	Specifying/canceling double printing
16	J	Printing and feeds the paper n/360 inch
17	R	Selecting the international characters
18	c3	Selecting the paper near end sensor effective for outputting the paper end signal
19	c4	Selecting the paper near end sensor effective for stopping printing
20	c5	Enabling/disabling the panel switches
21	d	Printing and feeding the paper by n-lines
22	p	Generating the specified pulses
23	t	Selecting the character codes table
24	v	Transmitting the printer status
25	u	Transmitting the status of the peripheral device
26	{	Specifying/canceling the inverted characters
27	V	Specifying/canceling the 90°- right-turned characters
28	\$	Specifying the absolute position
29	¥	Specifying the relative position
30	GS k	Printing the bar code
31	w	Selecting the horizontal size (scale factor) of the bar code
32	h	Selecting the height of the bar code
33	H	Selecting the printing position of the HRI characters
34	f	Selecting the font of HRI character
35	*	Defining the download bit image
36	/	Printing the download bit image
37	:	Starting/ending the macro definition
38	^	Executing the macro
39	ESC =	Data input control
40	a	Aligning the the characters
41	i	Full cut
42	m	Partial cut

9.2 Input Data Format

(1) Horizontal Tab Command (HT)

Code : [09]h

Moves the printing position to the next horizontal tab position

The horizontal tab position is set by ESC D. The initial setting of the horizontal tab position is every 8 characters (9th columns, 17th columns, 25th columns, 33rd columns, 41st columns) of Font A.

(2) Print command (CR)

Code : [0D]h

1) When the DIP switch segment DS1-8 is set to OFF

This command is ignored.

2) When the DIP switch segment DS 1 - 8 is set to ON

Printing is done when the internal input buffer has the data. When it has no data, however, line feed is done.

(3) Printing paper feed command (LF)

Code : [0A]h

Prints the data in the internal input buffer and feeds the line(s) based on the set line feed rate.

(4) Setting the right space amount of the characters (ESC SP n)

Code : [1B]h + [20]h + n

* {0 ≤ n ≤ 20} The data is described with the hexadecimal code.

Set the right space of the amount of the character in term of dots (in an increment of 1/203 inch). As an initial value, n=0. In the double width magnification mode, the right space amount is double the set amount.

(5) Specifying collectively the print mode (ESC ! n)

Code : [1Bh] + [21h] + n

* {0 ≤ n ≤ FF} The data is described with the hexadecimal code.

Specifies the print mode. Each bit of n has the following meaning.

Bit	Function	Value	
		0	1
0	Character font	Font A	Font B
1	Undefined		
2	Undefined		
3	Highlighting	Cancel	Specify
4	Vertical double magnification	Cancel	Specify
5	Horizontal double magnification	Cancel	Specify
6	Undefined		
7	Underline	Cancel	Specify

- Four-fold characters are formed by simultaneously specifying both vertical and horizontal double magnifications.
- The entire printed character width is underlined. However, the characters skipped by the horizontal tab are not. The 90°C –right-turned characters are also not underlined.
- An underline width is set by ESC –. The initial value is "0. "

(6) Specifying/canceling the download character set (ESC % n)

Code : [1B]h + [25]h + n

* {0 ≤ n ≤ FF} The data is described with the hexadecimal code.

Specifying or cancels the download characters. The download characters and download bit images cannot be defined simultaneously. For n, lowest bit (n0) is effective. The lowest bit has the following meanings.

n0 = 0 : Cancels the download character set

n0 = 1 : Specifying the download character set

(7) Defining the download characters (ESC & s n m a {D1 D2 ~ Dn})

Code : [1B]h + [26]h + s + n + m + a + Dn

* {s = 03}

{20 ≤ n ≤ 7E}

{20 ≤ m ≤ 7E}

{For the Font A; 0 ≤ a ≤ 0C, For the Font B; 0 ≤ a ≤ 09}

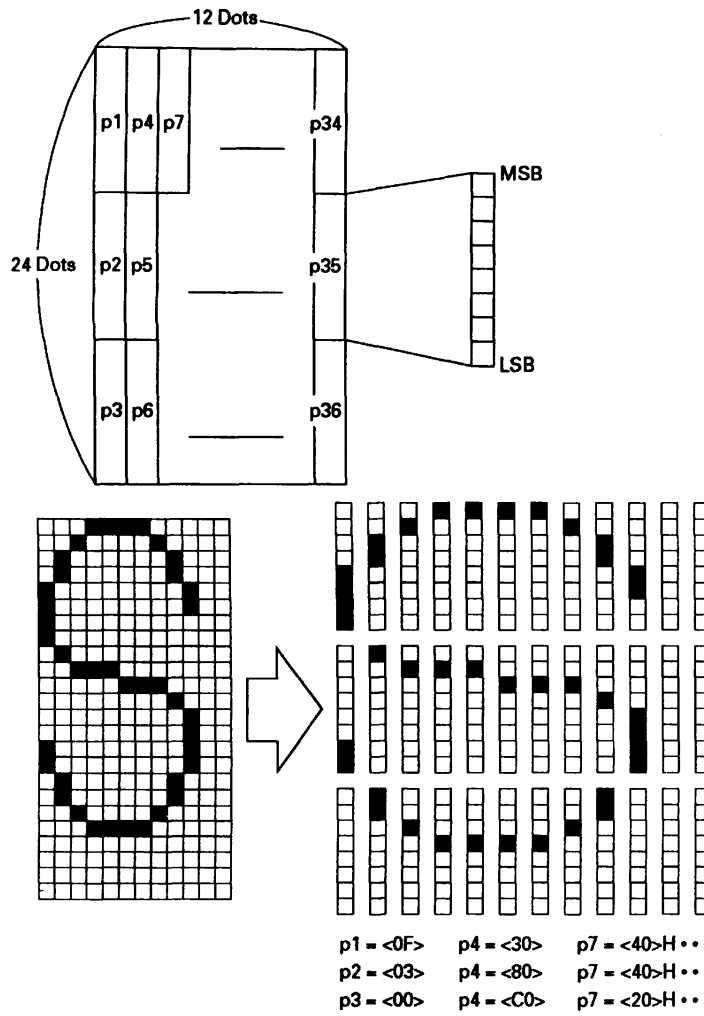
The data is described with the hexadecimal code.

Defines the font for the download characters of alphanumeric characters.

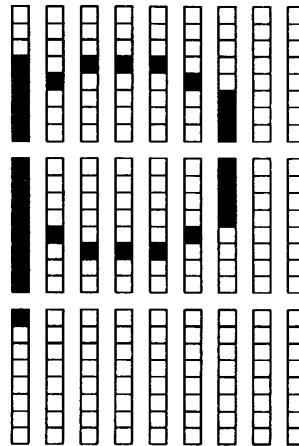
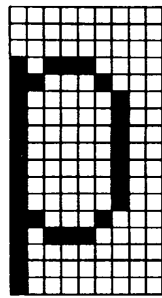
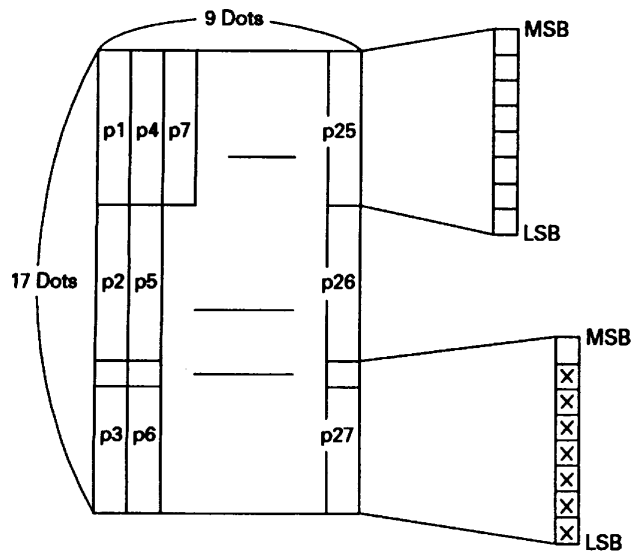
- "s" denotes the number of bytes in the vertical direction.
- "n" denotes a start character code, and m denotes an end character code. When defining only one character, n should be equal to m (n = m).
- Definable character codes are ASCII codes, totally 95 characters ranging from <20>H to <7E>H.
- "a" denotes the number of dots in the horizontal direction to be defined.
- "Dn" is the data to be defined and denotes a pattern corresponding to "a" dot in the horizontal direction from the left end. The right remaining pattern is filled with space.
- Once the download characters are defined, they remain effective until redefinition, execution of ESC @, execution of GS *, or power-off.

[Example]

For the Font A



For the Font B



p1 = <1F> p4 = <08>H p7 = <10>H...
 p2 = <FF> p4 = <08>H p7 = <04>H...
 p3 = <80> p4 = <00>H p7 = <00>H...

(8) Specifying the bit Image (ESC * m n1 n2 D1 ~ Dn)

Code : [1B]h + [2A]h + m + n1 + n2 + Dn

* {m= Bit image mode (refer to the table below)}

{0 ≤ n1 ≤ FF}

{0 ≤ n2 ≤ 02}

The data is described with the hexadecimal code.

Prints the data in the form of bit image in accordance with the bit image mode specified by "m".

- The number of bit printed is divided by 256, and n2 and is assumed to be a quotient, and n1 to be the remainder.
- The total number of dots printed in the form of bit image is n1 + (256 × n2).
- When the bit image is entered beyond a 1 dot line (576 dots) position, the surplus data is discarded.
- For the bit image data (Dn), the bit to be printed is set to "1" and that not to be printed to "0".
- The following table shows the bit image mode.

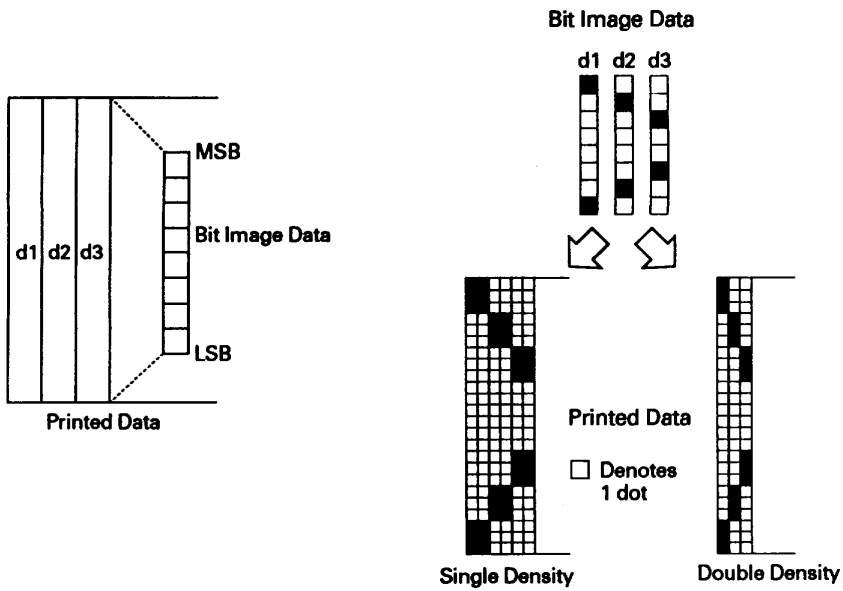
() = For 42 columns spec.

m(Hex)	Mode	Vertical		Horizontal	
		No.of Dots	Dot Density	Dot Density	Max. No. of Dots
0	8-dot single density	8	67 DPI	101 DPI	288 (252)
1	8-dot double density	8	67 DPI	203 DPI	576 (504)
20	24-dot single density	24	203 DPI	101 DPI	288 (252)
21	24-dot double density	24	203 DPI	203 DPI	576 (504)

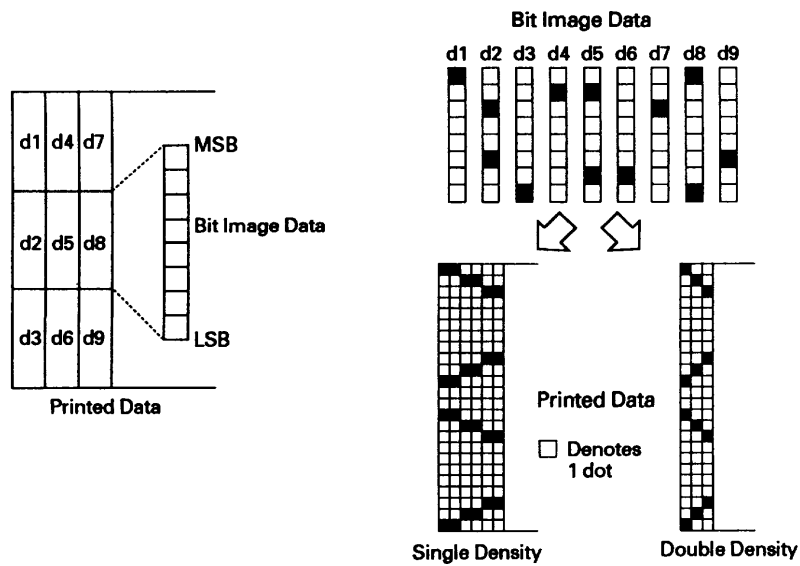
- When the value set for "m (bit image mode)" does not meet the condition, the data subsequent to n1 is processed as printing data.

The following shows the relations between the bit image data and printed dots

- 8-dot Bit Image



- 24-dot Bit Image



(9) Specifying/canceling the underline (ESC – n)

Code: [1B]h + [2D]h + n

* {0 ≤ n ≤ 02} The data is described with the hexadecimal code.

Specifying or cancels the underline.

- An underline is provided for the entire printed character width except a portion skipped by HT.
- The 90°- right-turned characters are not underlined.
- The following table lists the types of underlines depending on the values an initial value is "1".

n (Hex)	Type
0	Cancels an underline
1	Specifies a 1-dot width underline
2	Specifies a 2-dot-wide underline

(10) Specifying the 1/6 inch line feed rate (ESC 2)

Code : [1B]h + [32]h

Sets a line feed rate per line to 1/6 inch.

(11) Setting the line feed rate n/360 inch (ESC 3 n)

Code : [1B]h + [33]h + n

* {0 ≤ n ≤ FF} The data is described with the hexadecimal code.

Sets a line feed rate per line to n/360 inch.

- The initial value is n = [3C]h
- Since an actual mechanical pitch is 1/203 inch, it is internally converted approximate to the value specified with this command.

(12) Initializing the printer (ESC @)

Code : [1B]h + [40]h

Clears the data stored in the internal print buffer and initializes various settings (default).

- The data in the internal input buffer is not cleared.
- Reads in the DIP switches again.

(13) Setting the horizontal tab position (ESC D n NUL)

Code : [1B]h + [44]h + n [00]h
 * {0 ≤ n ≤ FF} The data is described with the hexadecimal code.

Sets the horizontal tab position.

- "n" denotes the number of columns from the beginning to the horizontal tab position. At this time, "n" is the setting position minus 1.
- The tab position is set in the position of the character width × n from the beginning of the line. The character width at this time includes the right space amount of the character and is doubled when double width magnification is specified.
- Up to 32 tab positions can be set. Setting of the tab positions beyond this limit is ignored.
- ESC D NUL clears all of set tab positions. After clearing, HT is ignored

(14) Setting the horizontal tab position (ESC D n NUL)

Code : [1B]h + [44]h + n [00]h
 * {0 ≤ n ≤ FF} The data is described with the hexadecimal code.

Sets the horizontal tab position.

- Only the lowest bit(n0) is effective for "n".
- The following table lists the controls by the lowest bit (n0).

n0	Type
0	Canceling highlighting.
1	Specifying highlighting.

- Effective for all characters.
- A highlighted character has one dot each added in the horizontal direction.

(15) Specifying/canceling double printing (ESC G n)

Code : [1B]h + [47]h + n

* {0 ≤ n ≤ FF} The data is described with the hexadecimal code.

Specifying/canceling the double printing.

- Only the lowest bit (n0) is effective for "n".
- The following table list the controls by "n".

n0	Type
0	Cancel double printing.
1	Specify double printing.

- The printing results of double printing and highlighted printing are exactly the same.

(16) Printing and feeding the paper n/360 inch (ESC J n)

Code : [1B]h + [4A]h + n

* {0 ≤ n ≤ FF} The data is described with the hexadecimal code.

Prints the data in the print buffer and feeds the paper by n/360 inch.

- A set rate does not remain.
- The beginning of the line is assumed to be the next printing start position.
- Since an actual mechanical pitch is 1/203 inch, it is internally converted approximate to the value specified with this command.

(17) Selecting the international characters (ESC R n)

Code : [1B]h + [52]h + n

* {0 ≤ n ≤ 0A} The data is described with the hexadecimal code.

Selecting the international characters.

- Depending on the values of "n", following character sets are specified.

n (Hex)	Character Set
0	U.S.A.
1	France
2	Germany
3	U.K.
4	Denmark I
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
A	Denmark II

- An initial value of "n" is specified by the DIP switches (DS2-5.6.7.8)

(18) Selecting of paper near end sensor available for output of paper near end signal (ESC c 3 n)

Code : [1B]h + [63]h + [33]h + n

* $\{0 \leq n \leq FF\}$ The data is described with the hexadecimal code

Specifying the condition of paper near end sensor to output paper near end signal.

- Only the lowest bit (n0) is effective for "n".
- The bit of "n" has the following meaning.

n0	Type
0	Paper near end disabled
1	Paper near end enableed

- An initial value of "n" is specified by the DIP switch (DS1-5).

[Caution] Parallel interface only.

(19) Setting of paper near end sensor available for print stop (ESC c 4 n)

Code : [1B]h + [63]h + [34]h + n

* {0 ≤ n ≤ FF} The data is described with the hexadecimal code.

Specifying the condition of paper near end sensor to stop printing operation.

- Only the lowest bit (n0) is effective for "n".
- The bit of "n" has the followings meaning.

n0	Type
0	Paper near end disabled
1	Paper near end enabled

- An initial value of "n" is specified by the DIP switch (DS1 -5).

(20) Enabling/disabling the panel switch (ESC c 5 n)

Code : [1B]h + [63]h + [35]h + n

* {0 ≤ n ≤ FF} The data is described with the hexadecimal code.

Selecting the panel switch enable or disable.

- Only the lowest bit (n0) is effective for "n".
- The bit of "n" has the followings meaning.

n0	Type
0	LF switch enabled
1	LF switch disabled

- The initial value of n is "0".

(21) Printing and feeding the paper by n-lines (ESC d n)

Code : [1B]h + [64]h + n

* {0 ≤ n ≤ FF} The data is described with the hexadecimal code.

Prints the data in the print buffer and feeds the paper by n lines.

- A set rate does not remain.
- The beginning of the line is assumed to be the next printing start position.

(22) Generating the specified pulses (ESC p m n1 n2)

Code : [1B]h + [70]h + m + n + n2

* {m = Connector pin number (refer to the table below)}

{0 ≤ n1 ≤ FF}

{0 ≤ n2 ≤ FF} The data is described with the hexadecimal code.

The signals specified by n1 and n2 are output to the connector pin.

- The bit of "m" (m0) has the followings meanings.

m0	Type
0	Drawer kick pin No. 2
1	Drawer kick pin No. 5

- The ON time is $n1 \times 2$ ms, and OFF time as $n2 \times 2$ ms.
- When "m" is beyond a definition range, n0 signal is output, discarding n1 and n2.
- A drawer drive duty is as follows.

$$\frac{\text{ON Time}}{\text{On time} + \text{OFF time}} \leq 0.2$$

(Take OFF time should be 4 times or more longer than the ON time.)

(23) Selecting Character Code Table (ESC t n)

Code : [1B]h + [74]h + n

* {0 ≤ n ≤ 1} The data is described with the hexadecimal code.

Selecting Page n on the character code table:

- "n" has the following meanings.

n (Hex)	Type
0	IBM character No. 2

(24) Transmitting the printer status (ESC v)

Code : [1B]h + [76]h

Transmits the current printer status.

- The transmitted status is of 1 byte and its contents are as shown in the table below.
- In case of DTR/DSR control, only one byte is transmitted after confirming that the host is ready to receive (DSR signal is in the Space mode). In case of XON/XOFF control, only one byte is transmitted without confirming the state of the DSR signal.
- In case of DTR/DSR control, if the host is not ready to receive (DSR signal is in the Mark mode), it waits to get ready to receive.

Bit	Function	Value	
		0	1
0	Paper near end	With Paper	Without Paper
1	Undefined		
2	Paper end	With Paper	Without Paper
3	Undefined		
4	Unused	Fixed to 0	–
5	Undefined		
6	Undefined		
7	Undefined		

[Caution] Serial interface only

(25) Transmitting the status of the peripheral device (ESC u n)

Code : [1B]h + [75]h + n
 * {n = 0}

Transmits the current status of connector pin No.3.

- "n" has the following meanings.

n (Hex)	Type
0	Drawer kick connector No. 3

- The transmitted status is of 1 byte and its contents are shown in the table below.
- When nothing is connected to the connector, The bit 0 of "n" is always "1".
- In case of DTR/DSR control, only one byte is transmitted after confirming that the host is ready to receive (DSR signal is in Space mode). In case of XON/ XOFF control, only one byte is transmitted without confirming the state of the DSR signal.
- In case of DTR/DSR control, if the host is not ready to receive (DSR signal is in the Mark mode), it waits to get ready to receive.

Bit	Function	Value	
		0	1
0	No. 3 pin's level	“L”	“H”
1	Undefined		
2	Undefined		
3	Undefined		
4	Unused	Fixed to 0	–
5	Undefined		
6	Undefined		
7	Undefined		

[Caution] Serial interface only

(26) Specifying/Canceling the inverted Characters (ESC {n)

Code : [1B]h + [7B]h + n

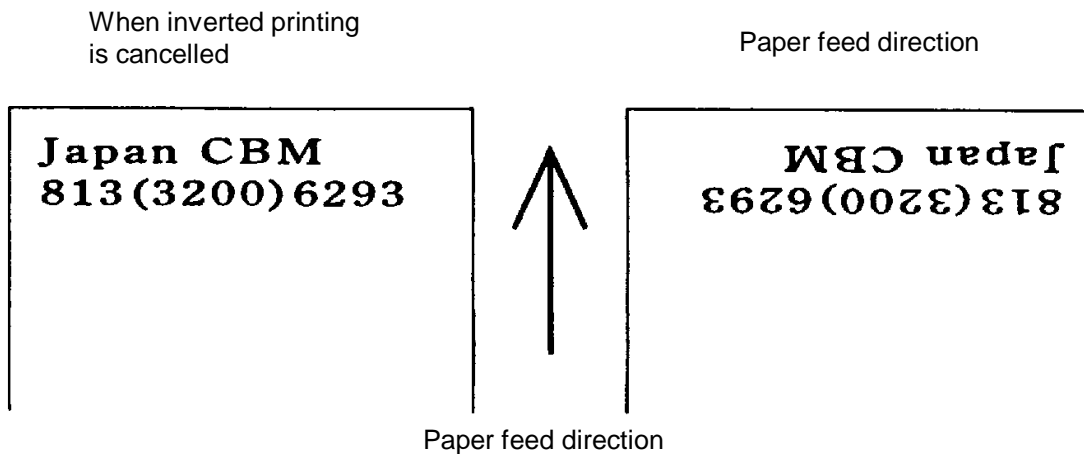
* {0 ≤ n ≤ FF} The data is described with the hexadecimal code.

Specifying/canceling inverted characters.

- "n" is valid only for the lowest bit (n0).
- Bit n (n0) means the followings.

n0	Type
0	Cancel the inverted characters
1	Specify the inverted characters

- Effective only when specified at the beginning of the line.
- Printing examples are shown below.
- An initial value of "n" is "0".



(27) Specifying/canceling the 90°-right- turned characters (ESC V n)

Code : [1B]h + [56]h + n

* {0 ≤ n ≤ 1} The data is described with the hexadecimal code.

- The 90°-right- turned characters are not underlined.
- "n" has the following meanings.

n (Hex)	Type
0	Cancel the 90°-right- turned characters
1	Specify the 90°-right- turned characters

- An initial value of "n" is "0".

(28) Specifying Absolute Positions (ESC \$ n1 n2)

Code : [1B]h + [24]h + n1 + n2

* {0 ≤ n1 ≤ FF}

{0 ≤ n2 ≤ 1} The data is described with the hexadecimal code.

Specifies the printing start position in terms of the number of dots from the beginning of the line (in an increment of 1/203 inch).

- The number of dots is divided by 256, and a quotient is assumed to be n2, and the remainder to be n1. Therefore, the printing start position is n1 + n2 × 256 from the beginning of the line.
- The position specified beyond the end of the line is ignored.

(29) Specifying the relative position (ESC ¥ n1 n2)

Code : [1B]h + [5C]h + n1 + n2

* {0 ≤ n1 ≤ FF}

{0 ≤ n2 ≤ FF} The data is described with the hexadecimal code.

Specifies the printing start position in terms of the number of dots from the current position (in an increment of 1/203 inch).

- The right direction is plus (+), and left direction is minus (-).
- When specifying N dots in the minus (left) direction, specify with a complement of N.
- N dots = 65536 - N
- The number of dots is divided by 256, and a quotient is assumed to be n2, and the remainder to be n1.
- The position specified beyond the end of the line is ignored.

(30) Printing the bar code (GS k n Dn NUL)

Code : [1D]h + [6B]h + n + Dn + [00]h

* $\{0 \leq n \leq 7\}$ The data is described with the hexadecimal code.

Selects the bar code system and prints the bar code.

- The beginning of the line is assumed to be the next printing start position.
- selects the bar code system listed in the table below, depending on the values of "n".
- Dn denotes the characters to be printed.

n (Hex)	Bar code system
0	UPC-A
1	UPC-E
2	JAN13 (EAN)
3	AN 8 (EAN)
4	CODE 39
5	ITF
6	CODABAR
7	CODE 128

- When the data exists in the print buffer, this command is ignored.
- When the character code Dn denotes the unprintable characters, the subsequent data is treated as normal printing data.
- When you select the bar code system where the fixed number of characters is printed, the number of characters must coincide with the number of characters printed.
- When the horizontal direction exceeds the length of one line, the surplus portion is not printed.

(31) Selecting Bar Code width (GS w n)

Code : [1D]H + [77]H + n

* {2 ≤ n ≤ 4} The data is described with the hexadecimal code.

Selects the horizontal size of the bar code.

- An initial value of the horizontal size is "3".

(32) Selecting the height of the bar code (GS h n)

Code : [1D]H + [68]H + n

* {1 ≤ n ≤ FF} The data is described with the hexadecimal code.

Selects the height of the bar code.

- "n" denotes the number of dots in the vertical direction.
- An initial value of "n" is "162".

(33) Selecting Printing Position of HRI Characters (GS H n)

Code : [1D]H + [48]H + n

* {0 ≤ n ≤ 3} The data is described with the hexadecimal code.

Selects the printing position of the HRI characters when printing the bar code.

- "n" has the following meanings.

n (Hex)	Printing Position
0	No printing
1	Above the bar code
2	Below the bar code
3	Both above and below the bar code

- The HRI characters are printed in the font selected by GS f.
- An initial value of "n" is "0".

(34) Selecting the font of the HRI characters (GS f n)

Code : [1D]h + [66]h + n

* {0 ≤ n1 ≤ 1} The data is described with the hexadecimal code.

Select the font of the HRI characters when printing the bar code.

- "n" has the following meanings.

n (Hex)	Font
0	Font A
1	Font B

(35) Defining the download bit image (GS * n1 n2 Dn)

Code : [1D]h + [2A]h + n1 + n2 + Dn

* {0 ≤ n1 ≤ FF}

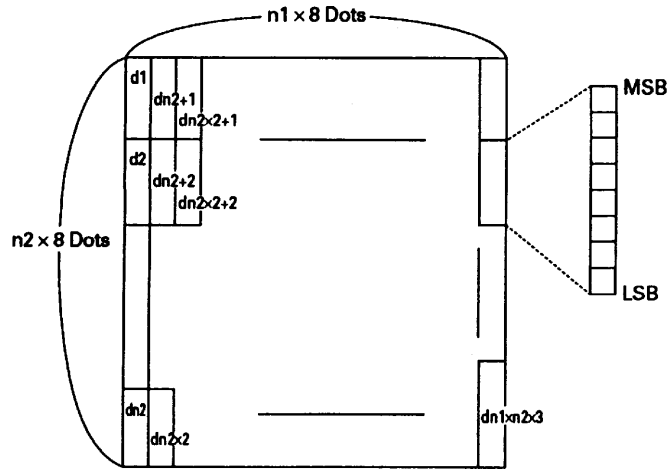
{0 ≤ n2 ≤ 30}

{n1 × n2 ≤ 51F} The data is described with the hexadecimal code.

Defines the download bit image which has the number of dots specified by n1 and n2.

- The numbers of dots in the horizontal direction assumed to be n1 × 8, and that in the vertical direction to be n2 × 8.
- Dn denotes the bit image data.
- Once the download bit image is defined, it remains effective until it is redefined, ESC @ is executed, ESC & is executed, or the power is turned off.
- The download characters and download bit image cannot be defined at the same time. Executing this command clears the definition of the download characters.

- The following figure shows the relations between the bit image data and defined dots.



(34) Printing Download Bit Image (GS / m)

Code : [1D]h + [2F]h + m

* {0 ≤ m ≤ 3} The data is described with the hexadecimal code.

Prints the download bit images in the mode specified by "m".

- The following table lists the mode selected by "m".

m	Mode Name	Vertical Dot Density	Horizontal Dot Density
0	Normal mode	203 DPI	203 DPI
1	Hor. double mode	203 DPI	101 DPI
2	Vert. double mode	101 DPI	203 DPI
3	4-fold mode	101 DPI	101 DPI

- When the data exists in the print buffer, this command is ignored.
- When the download bit image has not been defined, this command is ignored.
- The part of the download bit image exceeding the length of one line is not printed.
- The download characters and download bit image cannot be defined the same time.

(37) Starting/ending the macro definition (GS :)

Code : [1D]h + [3A]h

Specifies a start or end of macro definition. Up to 2,048 bytes can be defined as macro. The bytes exceeding 2,048 bytes cannot be defined.

- The definition is not cleared even if ESC @ (initializing the printer) is executed. Therefore, ESC @ can be included in the definition.
- Regular printing is performed even during macro definition

(38) Macro Execution (GS^ n1 n2 n3)

Code : [1D]h + [5E]h + n1 + n2 + n3

* {0 ≤ n1 ≤ FF}

{0 ≤ n2 ≤ FF}

{0 ≤ n3 ≤ 1} The data is described with the hexadecimal code

Executing what is defined as macro.

- The following describes n1 through n3:

n1 : Macro execution times

n2 : Wait time at macro execution. Wait for n2 × 100 msec for each execution.

n3 : Macro execution mode

n3	Mode
0	Continuous execution
1	Execution by the paper feed switch

Continuous execution : The macro is executed n1 times continuously at the time intervals specified by n2.

Execution by the paper

Feed switch : After waiting for lapse of time specified by n2, the ERROR LED flickers and the paper feed switch is waited to be pressed. When it is pressed, the macro is executed once. This action is repeated n1 times.

- When this command is accepted during macro definition, it means cancellation of macro definition. When this time done, the definition is cleared.
- Nothing is executed when the macro has been undefined or n1=0 has been set.
- When n3 = 1 is set and the macro is being executed, the paper cannot be fed by the paper feed switch.

(39) Data input control (ESC = n)

Code : [1B]h + [3D]h + n

* {0 ≤ n ≤ FF} The data is described with the hexadecimal code.

Selects the device where data input from the host is effective.

- Each bit of "n" has the following meanings.

Bit	Device	Value	
		0	1
0	Printer	Disabled	Enabled
1	Undefined		
2	Undefined		
3	Undefined		
4	Undefined		
5	Undefined		
6	Undefined		
7	Undefined		

- When the printer is disabled, this printer discards all received data until it is enabled by this command.
- Even if the printer is disabled, it may be placed in the busy state by printer operation.
- The initial value of "n" is "1".

(40) Aligning the characters (ESC a n)

Code : [1B]h + [61]h + n

* {0 ≤ n ≤ 2} The data is described with the hexadecimal code.

Aligns all printed data in one line to a specified position.

- Justification listed in the following table is performed depending on the value of "n".

n (Hex)	Position
0	Left alignment
1	Center alignment
2	Right alignment

- Effective only when this is entered at the beginning of the line.
- The initial value of "n" is "0".

(41) Full cut (ESC i)

Code : [1B]h + [69]h

Cuts the paper fully.

- Effective only when this is entered at the beginning of the line.
- CBM-231 only.

(42) Partial cut (ESC m)

Code : [1B]h + [6D]h

Cuts the paper partially.

- Effective only when this is entered at the beginning of the line.
- CBM-231 only.

10. Character Code Table

10.1 International

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	DEL		SP	0	@	P	'	p	ç	é	á	☒	ˆ	ˆ	α	≡
1		¡	!	1	A	Q	a	q	ú	á	í	☒	ˆ	ˆ	β	±
2			·	2	B	R	b	r	é	â	ó	☒	ˆ	ˆ	Γ	≈
3		¡	#	3	C	S	c	s	á	ó	ú	|	ˆ	ˆ	κ	≡
4			\$	4	D	T	d	t	á	ó	ñ	ˆ	ˆ	ˆ	Σ	Γ
5			%	5	E	U	e	u	á	ó	ñ	ˆ	ˆ	ˆ	σ	Γ
6			&	6	F	V	f	v	á	ó	í	ˆ	ˆ	ˆ	μ	+
7			·	7	G	W	g	w	ç	ú	í	ˆ	ˆ	ˆ	τ	≈
8			(	8	H	X	h	x	ó	ý	ˆ	ˆ	ˆ	ˆ	φ	·
9	HT		)	9	I	Y	i	y	ó	ó	ˆ	ˆ	ˆ	ˆ	θ	·
A	LP		*	:	J	Z	j	z	ó	ó	ˆ	ˆ	ˆ	ˆ	Ω	·
B		ESC	+	:	K	[	k	(	í	é	ˆ	ˆ	ˆ	ˆ	δ	√
C		PS	,	<	L	\	l	|	í	£	ˆ	ˆ	ˆ	ˆ	∞	·
D		GS	-	=	M	]	m	)	í	¥	ˆ	ˆ	ˆ	ˆ	φ	·
E			.	>	N	·	n	~	ı	℞	ˆ	ˆ	ˆ	ˆ	ε	≡
F			/	?	O	-	o	€	ı	f	ˆ	ˆ	ˆ	ˆ	∩	SP

10.2 International Character Code Table

	Country	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
0	U.S.A.	#	\$	@	[	\	\]	^	`	(	|	)	~
1	France	#	\$	à	·	ç	§	^	`	é	ù	è	~
2	Germany	#	\$	§	λ	0	0	^	`	a	o	u	ü
3	U.K.	£	\$	@	[	\	\]	^	`	(	|	)	~
4	Denmark I	#	\$	@	Å	Ø	Λ	^	`	æ	ø	å	~
5	Sweden	#	¤	é	λ	0	λ	0	é	a	o	a	u
6	Italy	#	\$	@	·	\	é	^	`	à	ó	è	ì
7	Spain	R	\$	@	i	ñ	¿	^	`	~	n)	~
8	Japan	#	\$	@	[	¥	]	^	`	(	|	)	~
9	Norway	#	¤	é	Å	Ø	Λ	0	é	æ	ø	å	u
10	Denmark II	#	\$	é	Å	Ø	Λ	0	é	æ	ø	å	u

Appendix 1. PRECAUTIONS AND MAINTENANCE

1.1 Precaution for Handling the Printer Mechanism

1. Use of unspecified paper may not assure you of printing quality and product life.
2. With the printing head kept down, do not turn the paper feed knob or pull out the paper.
3. Do not touch the heating element's surface of the head.

1.2 Precautions for Handling the Thermal Paper

1. A contact of chemicals or oil may discolor or erase the record.
2. Rubbing the paper hard with nail or hard metal may discolor it.
3. Discoloring starts at approximately 70°C. Pay attention to an effect of heat, humidity, light, etc.

1.3 Other Precautions

1. Be careful not to drop foreign matter such as clip, pin into the main body.
2. When cleaning the surface of the main body case, use neutral detergent.
Do not use alcohol, thinner, etc.

1.4 Eliminating the Jammed Paper

1. Open the auto cutter, move up the printing head, and eliminate the paper. (CBM-231)
2. When the paper is coiling around the platen roller, eliminate it gradually, turning the paper feed knob.
[Caution] Do not touch the printing head or motor immediately after printing because they are very hot.

1.5 Eliminating the Paper Powder

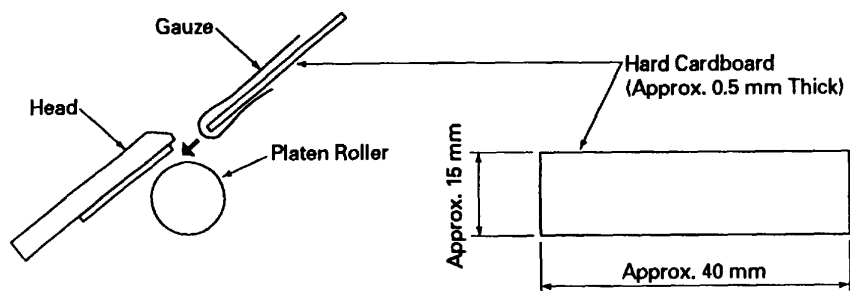
When the printer is contaminated with paper powder, clean it with a brush or vacuum cleaner.

[Caution] Do not touch the printing head or motor immediately after printing because they are very hot.

1.6 Cleaning the Head

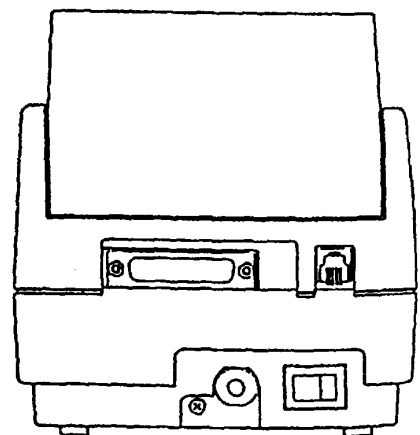
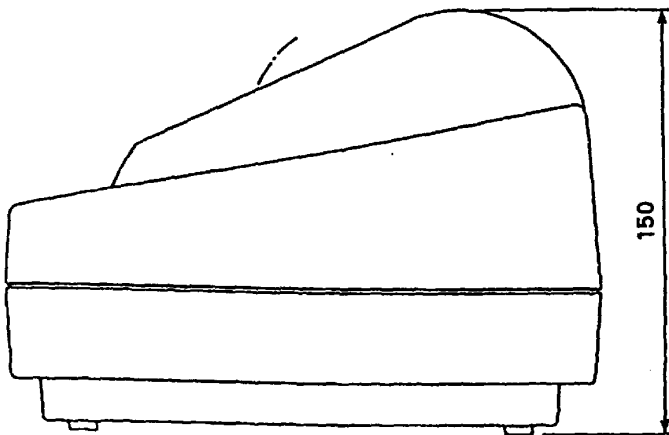
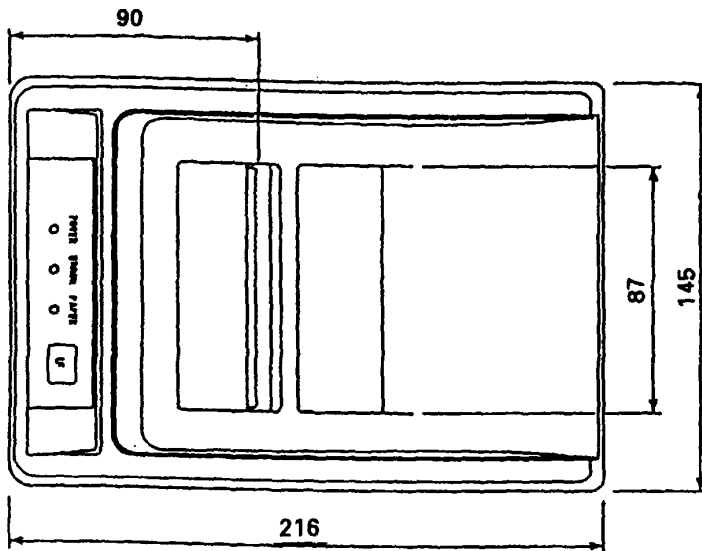
1. Open the auto cutter and move up the printing head.(CBM-231)
2. Use the cardboard and gauze as shown in the figure below.
3. Dip the gauze slightly into alcohol, insert it in between the printing head and platen roller as shown in the figure, and clean by moving it aside.

[Caution] Do not touch the printing head or motor immediately after printing because they are very hot.

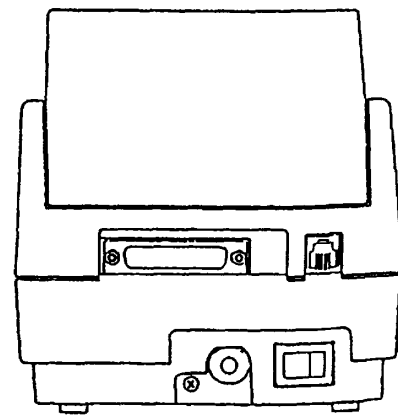
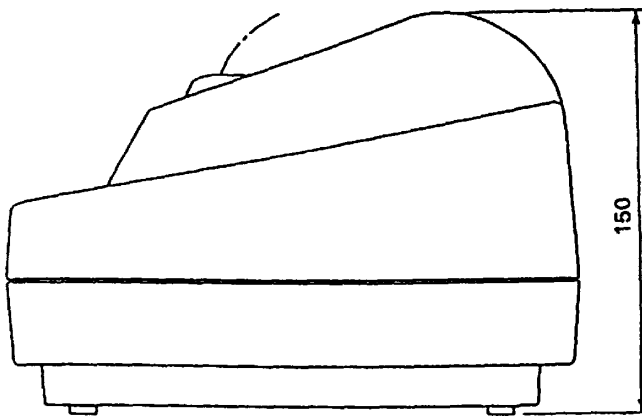
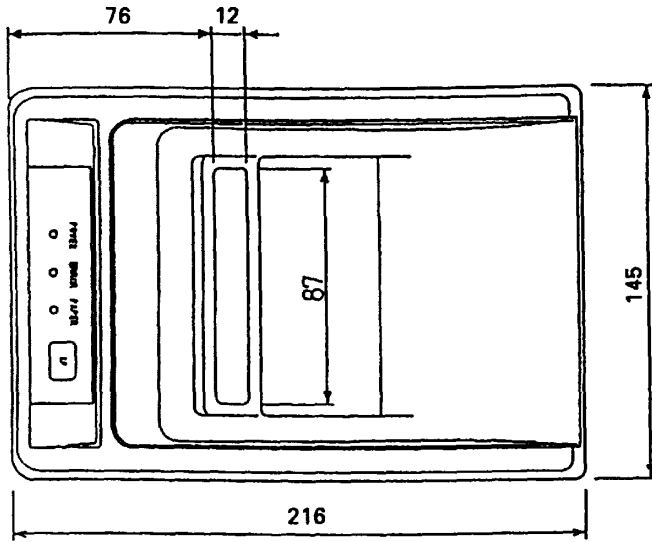


Appendix 2. External Dimensions

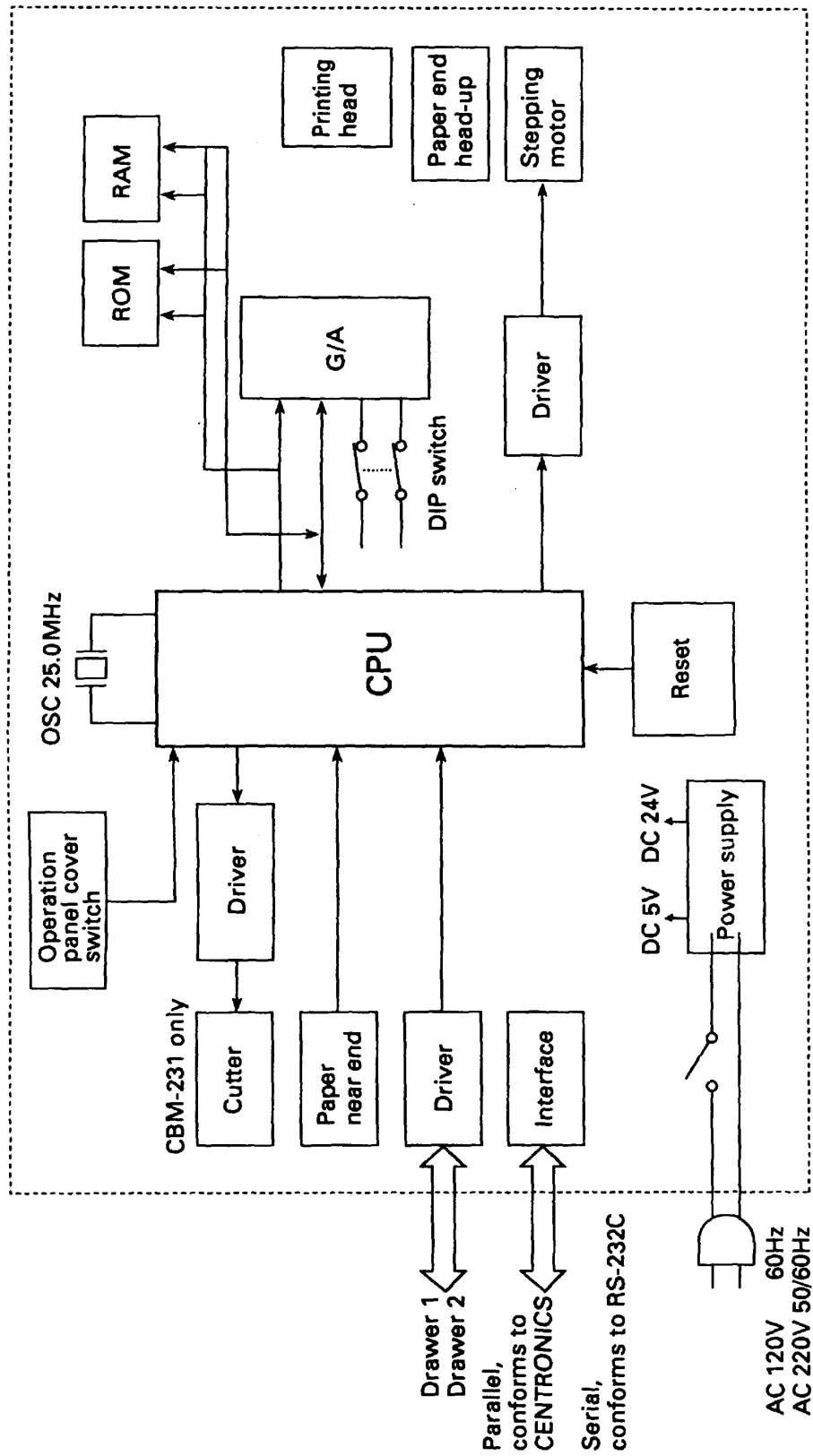
1. CBM-230



2. CBM-231



Appendix 3. Block Diagram



Japan CBM Corporation

Information Systems Division — CBM Bldg., 5-68-10, Nakano, Nakano-ku, Tokyo 164-0001, Japan
Head Office — Tel: (+81-3) 5345-7540 Fax: (+81-3) 5345-7541